

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : TOSHIBA LIGHTING &amp; TECHNOL CORP

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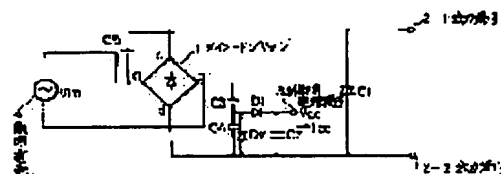
(72)Inventor : URATANI KAZUYUKI  
SHIMIZU KEIICHI

## (54) POWER-SUPPLY CIRCUIT

## (57)Abstract:

PURPOSE: To prevent the output voltage of a main DC power supply from becoming higher than a prescribed value even when a current flowing on the side of a load is small and to reduce the loss of electric power used to produce a DC power supply for control.

CONSTITUTION: A diode bridge 1 full-wave-rectifies an AC current which is input from a commercial power supply 4, and the AC current is converted into a main DC current. On the other hand, a half-wave rectified voltage in the diode bridge 1 is divided by capacitors C3, C4, divided voltages are rectified by diodes D1, D2, they are smoothed by a capacitor C2, and a DC power supply for control is produced. When a current in a load becomes small, a voltage which has been charged in the capacitors C3, C4 is added to a smoothing capacitor C1, and a voltage which has been charged in a capacitor C5 is added to the capacitor C1. However, since the polarity of the charged voltage in the capacitors C3, C4 is opposite to that of the charged voltage in the capacitor, the terminal voltage of the capacitor C1 maintains a prescribed voltage after all.



## LEGAL STATUS

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CLAIMS

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[Claim(s)]

[Claim 1] After carrying out full wave rectification of the AC power supply in a diode bridge, while carrying out smooth [ of this ] by the capacitor for smooth and obtaining the main DC power supply In the power circuit which pressures partially the half-wave rectification electrical potential difference outputted from said diode bridge by two or more capacitors for partial pressures by which the series connection was carried out, and makes the power source for control from this partial pressure electrical potential difference The power circuit characterized by providing the capacitor charged on the half-wave rectification electrical potential difference of reversed polarity with the half-wave rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from said diode bridge.

[Claim 2] The power circuit according to claim 1 characterized by making equal to the series connection capacity of two or more of said capacitors for partial pressures capacity of the capacitor charged on the half-wave rectification electrical potential difference of reversed polarity with the half-wave rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from said diode bridge.

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]  
[Industrial Application] This invention relates to the configuration for starting the power circuit which changes AC power supply into DC power supply, especially obtaining the DC power supply for control apart from the main DC power supply.

[0002]  
[Description of the Prior Art] This kind of power circuit has the configuration as shown in drawing 2 conventionally. After full wave rectification of the alternating current inputted from a source power supply 4 was carried out by the diode bridge 1 and smooth is carried out by the capacitor C1 for smooth, it is outputted to the output terminal 2-1 and load side which is not illustrated from 2-2 (for example, inverter etc.). On the other hand, the DC power supply for control are taken out from the output terminal 3 for control connected at the node of resistance R1 and the capacitor C2 for smooth, and are supplied to the circuit for control which is not illustrated. That is, the voltage drop of the main DC-power-supply electrical potential difference outputted from a diode bridge 1 was carried out by resistance R1, and these DC power supply for control have obtained it. If input voltage is set to  $V_{in}$ , the current outputted from the terminal 3 for control is set to  $I_{cc}$  and output voltage of the power supply terminal 3 for control is set to  $V_{cc}$  here, in order to make the DC power supply for control by the voltage drop of resistance R1 as mentioned above, effective power consumption is a [formula].  

$$\sqrt{2} \times V_{in} \times I_{cc}$$

There was a fault that became and the power loss for creating the DC power supply for control became large.  
[0003] Then, in order to avoid the above-mentioned fault, the power circuit as shown in drawing 3 is developed. In this circuit, the series circuit which consists of capacitors C3 and C4 between the minus side output terminal of a diode bridge 1 and an alternating current input terminal is connected. After full wave rectification of the partial pressure electrical potential difference obtained from the node of these capacitors C3 and C4 is carried out by diodes D1 and D2, by the capacitor C2 for smooth, smooth [ of it ] is carried out and it becomes the DC power supply for control. In this circuit, since the half-wave rectification electrical potential difference outputted from a diode bridge 1 was pressured partially by capacitors C3 and C4 and the DC power supply for control have been obtained, effective power consumption serves as abbreviation  $V_{cc} \times I_{cc}$ , and can make a part for a power loss quite smaller than the circuit shown in drawing 2. However, since the in one direction flowed electrical potential difference charged by capacitors C3 and C4 is added to the charge electrical potential difference of the capacitor C1 for smooth when the current which flows to the output terminal 2-1 and load side connected to 2-2 is small, There was a fault that a terminal 2-1 and the electrical potential difference outputted from 2-2 will become high, and there was un-arranging [ of having a bad influence on the component by the side of a load depending on the case ].

[0004]  
[Problem(s) to be Solved by the Invention] While changing alternating current into a direct current as mentioned above and making the main DC power supply, in order to make small the power loss for making the DC power supply for control, the above-mentioned DC power supply for control are made in the conventional power circuit which makes the DC power supply for control with an electrical potential difference lower than said main DC power supply by pressuring partially the half-wave rectification electrical potential difference outputted from the diode bridge which changes said alternating current into a direct current by the capacitor. However, there was a fault of it being added to the main DC-power-supply electrical potential difference to which the charge electrical potential difference of said partial pressure capacitor is outputted, and the output voltage concerning said load having become high, and having a bad influence on the component by the side of a load etc. by this circuit when the current which the load of the main DC power supply has, and flows to a load side is small. [ light ]

[0005] Then, this invention removes the above-mentioned fault, and even if the current which flows to a load side is small, it aims at the power loss for the output voltage of the main DC power supply not becoming higher than a predetermined value, and making the DC power supply for control offering a small power circuit.

[0006]

[Means for Solving the Problem] This invention pressures partially the half-wave-rectification electrical potential difference outputted from said diode bridge while carrying out smooth [ of this ] by the capacitor for smooth and obtaining the main DC power supply, after carrying out full wave rectification of the AC power supply in a diode bridge by two or more capacitors for partial pressures by which the series connection was carried out, and has a configuration possessing the capacitor charged on the half-wave-rectification electrical potential difference of reversed polarity with the half-wave-rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from said diode bridge in the power circuit which makes the DC power supply for control from this partial pressure electrical potential difference.

[0007]

[Function] Although the electrical potential difference charged by the series circuit of the capacitor for partial pressures for making the DC power supply for control is added to the capacitor for smooth of an output side in the power circuit of this invention when the load current of the main DC power supply becomes small Since said charge electrical potential difference of the capacitor charged on the half-wave rectification electrical potential difference of reversed polarity with the half-wave rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from a diode bridge is added to the capacitor for smooth of said output side at coincidence, Said both charge electrical potential difference is canceled on said capacitor for smooth, and since the main DC-power-supply electrical potential difference outputted to said load side is pressured partially by the capacitor and makes control voltage while it can always maintain a predetermined electrical potential difference, it can make a power loss small.

[0008]

[Example] Hereafter, one example of this invention is explained with reference to a drawing. Drawing 1 is the circuit diagram having shown one example of the power circuit of this invention. The diode bridge which 1 carries out full wave rectification of the alternating current, and is changed into a direct current, The power supply terminal for control with which, as for 2-1 and 2-2, the output terminal of the main DC power supply is outputted, and, as for 3, the DC power supply for control are outputted, The source power supply to which 4 supplies AC power supply, and C1 The capacitor for smooth of the main DC power supply, The capacitor for partial pressures for C2 to make C3 and for the capacitor for smooth of the DC power supply for control and C4 make the DC power supply for control, The capacitor for cancellation for C5 to cancel the charge electrical potential difference of the capacitor for partial pressures on the capacitor C1 for smooth, and D1 and D2 are the diodes for rectification for obtaining the DC power supply for control.

[0009] Next, actuation of this example is explained. The alternating current supplied from a source power supply 4 is inputted into the input sides a and b of a diode bridge 1. A diode bridge 1 carries out full wave rectification of the inputted alternating current, changes it into a direct current, and outputs this to an output terminal 2-1 and 2-2 through a smoothing capacitor C1 from output sides c and d. Thus, after smooth [ of the main DC power supply outputted from diode BURUJI 1 ] is carried out by the smoothing capacitor C1, they are supplied to the output terminal 2-1 and load side which is not illustrated from 2-2. In addition, the output side d is [ the output side c of a diode bridge 1 ] on - side by + side.

[0010] After a partial pressure is carried out by capacitors C3 and C4 and the partial pressure electrical potential difference is rectified by diodes D1 and D2, smooth [ of the half-wave rectification electrical potential difference generated between the input side edge child b of a diode bridge 1 and the output side terminal d ] is further carried out by the capacitor C2, and it becomes the DC power supply for control. These DC power supply for control are supplied to the control circuit of the load described above from the power supply terminal 3 for control, for example etc. Here, the capacity of the capacitor C5 connected between the input terminal a of a diode bridge 1 and the output terminal c by the side of + and the above-mentioned capacitors C3 and C4 for partial pressures is set up as there is relation which is described below. By  $1/C5=1/C3+1/C4$ , after all,  $C5=C3C4/(C3+C4)$ , i.e., the capacity of a capacitor C5, is set up so that it may become equal to the capacity when carrying out series connection of the capacitors C3 and C4. And the series circuit of capacitors C3 and C4 is connected between the input terminal b of a diode bridge 1, and the output terminal d by the side of -, since the capacitor C5 is connected between the input terminal a of a diode bridge 1, and the output terminal c by the side of +, the polarity of a part for a part for the direct current voltage charged by capacitors C3 and C4 and the direct current voltage charged by the capacitor C5 is opposite, and it becomes tales doses.

[0011] By the way, although a part for the direct current voltage by which this example was also charged by the capacitors C3 and C4 for partial pressures will be added to the electrical potential difference charged by the

capacitor C1 if the current of an output terminal 2-1 and the main DC power supply supplied to a load side from 2-2 becomes small, at this time, the electrical potential difference charged by the capacitor C5 will also be added to the charge electrical potential difference of the capacitor C1 for smooth. However, on this electrical potential difference, since the polarity is opposite, the charge charged by the series circuit of capacitors C3 and C4 as described above, and the charge of each other on the capacitor C1 for smooth charged by the capacitor C5 are canceled after all, and the terminal voltage of a capacitor C1 is maintained by the predetermined main DC-power-supply electrical potential difference.

[0012] According to this example, since the DC power supply for control are pressuring partially and creating the half-wave rectification electrical potential difference outputted from a diode bridge 1 by capacitors C3 and C4, they can lessen the power loss for creating the DC power supply for control. Moreover, although the electrical potential difference charged by the series circuit of said capacitors C3 and C4 is added to the charge electrical potential difference of the capacitor C1 for smooth when the load current of the main DC power supply becomes small Since said charge electrical potential difference of the capacitor C5 by which the electrical potential difference of reversed polarity was charged with the charge electrical potential difference of said capacitors C3 and C4 is added to the capacitor C1 for smooth at coincidence, Even if said load current becomes small, it is prevented that the terminal voltage of the capacitor C1 for smooth becomes high, and he is trying for there to be no bad influence to the component by the side of a load.

[0013]  
[Effect of the Invention] The power loss for being able to prevent that the output voltage of the main DC power supply becomes higher than a predetermined value even if the current which flows to a load side is small according to the power circuit of this invention, as described above, and making the DC power supply for control can be made small.

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TECHNICAL FIELD

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[Industrial Application] This invention relates to the configuration for starting the power circuit which changes AC power supply into DC power supply, especially obtaining the DC power supply for control apart from the main DC power supply.

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 PRIOR ART
 

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[Description of the Prior Art] This kind of power circuit has the configuration as shown in drawing 2 conventionally. After full wave rectification of the alternating current inputted from a source power supply 4 was carried out by the diode bridge 1 and smooth is carried out by the capacitor C1 for smooth, it is outputted to the output terminal 2-1 and load side which is not illustrated from 2-2 (for example, inverter etc.). On the other hand, the DC power supply for control are taken out from the output terminal 3 for control connected at the node of resistance R1 and the capacitor C2 for smooth, and are supplied to the circuit for control which is not illustrated. That is, the voltage drop of the main DC-power-supply electrical potential difference outputted from a diode bridge 1 was carried out by resistance R1, and these DC power supply for control have obtained it. If input voltage is set to  $V_{in}$ , the current outputted from the terminal 3 for control is set to  $I_{cc}$  and output voltage of the power supply terminal 3 for control is set to  $V_{cc}$  here, in order to make the DC power supply for control by the voltage drop of resistance R1 as mentioned above, effective power consumption is a [formula].

$$\sqrt{2} \times V_{in} \times I_{cc}$$

There was a fault that became and the power loss for creating the DC power supply for control became large. [0003] Then, in order to avoid the above-mentioned fault, the power circuit as shown in drawing 3 is developed. In this circuit, the series circuit which consists of capacitors C3 and C4 between the minus side output terminal of a diode bridge 1 and an alternating current input terminal is connected. After full wave rectification of the partial pressure electrical potential difference obtained from the node of these capacitors C3 and C4 is carried out by diodes D1 and D2, by the capacitor C2 for smooth, smooth [ of it ] is carried out and it becomes the DC power supply for control. In this circuit, since the half-wave rectification electrical potential difference outputted from a diode bridge 1 was pressured partially by capacitors C3 and C4 and the DC power supply for control have been obtained, effective power consumption serves as abbreviation  $V_{cc} \times I_{cc}$ , and can make a part for a power loss quite smaller than the circuit shown in drawing 2 . However, since the in one direction flowed electrical potential difference charged by capacitors C3 and C4 is added to the charge electrical potential difference of the capacitor C1 for smooth when the current which flows to the output terminal 2-1 and load side connected to 2-2 is small, There was a fault that a terminal 2-1 and the electrical potential difference outputted from 2-2 will become high, and there was un-arranging [ of having a bad influence on the component by the side of a load depending on the case ].

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EFFECT OF THE INVENTION

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[Effect of the Invention] The power loss for being able to prevent that the output voltage of the main DC power supply becomes higher than a predetermined value even if the current which flows to a load side is small according to the power circuit of this invention, as described above, and making the DC power supply for control can be made small.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] While changing alternating current into a direct current as mentioned above and making the main DC power supply, in order to make small the power loss for making the DC power supply for control, the above-mentioned DC power supply for control are made in the conventional power circuit which makes the DC power supply for control with an electrical potential difference lower than said main DC power supply by pressuring partially the half-wave rectification electrical potential difference outputted from the diode bridge which changes said alternating current into a direct current by the capacitor. However, there was a fault of it being added to the main DC-power-supply electrical potential difference to which the charge electrical potential difference of said partial pressure capacitor is outputted, and the output voltage concerning said load having become high, and having a bad influence on the component by the side of a load etc. by this circuit when the current which the load of the main DC power supply has, and flows to a load side is small. [ light ] [0005] Then, this invention removes the above-mentioned fault, and even if the current which flows to a load side is small, it aims at the power loss for the output voltage of the main DC power supply not becoming higher than a predetermined value, and making the DC power supply for control offering a small power circuit.

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MEANS

[Means for Solving the Problem] This invention pressures partially the half-wave-rectification electrical potential difference outputted from said diode bridge while carrying out smooth [ of this ] by the capacitor for smooth and obtaining the main DC power supply, after carrying out full wave rectification of the AC power supply in a diode bridge by two or more capacitors for partial pressures by which the series connection was carried out, and has a configuration possessing the capacitor charged on the half-wave-rectification electrical potential difference of reversed polarity with the half-wave-rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from said diode bridge in the power circuit which makes the DC power supply for control from this partial pressure electrical potential difference.

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**OPERATION**

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[Function] Although the electrical potential difference charged by the series circuit of the capacitor for partial pressures for making the DC power supply for control is added to the capacitor for smooth of an output side in the power circuit of this invention when the load current of the main DC power supply becomes small Since said charge electrical potential difference of the capacitor charged on the half-wave rectification electrical potential difference of reversed polarity with the half-wave rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from a diode bridge is added to the capacitor for smooth of said output side at coincidence, Said both charge electrical potential difference is canceled on said capacitor for smooth, and since the main DC-power-supply electrical potential difference outputted to said load side is pressured partially by the capacitor and makes control voltage while it can always maintain a predetermined electrical potential difference, it can make a power loss small.

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## EXAMPLE

[Example] Hereafter, one example of this invention is explained with reference to a drawing. Drawing 1 is the circuit diagram having shown one example of the power circuit of this invention. The diode bridge which 1 carries out full wave rectification of the alternating current, and is changed into a direct current, The power supply terminal for control with which, as for 2-1 and 2-2, the output terminal of the main DC power supply is outputted, and, as for 3, the DC power supply for control are outputted, The source power supply to which 4 supplies AC power supply, and C1 The capacitor for smooth of the main DC power supply, The capacitor for partial pressures for C2 to make C3 and for the capacitor for smooth of the DC power supply for control and C4 make the DC power supply for control, The capacitor for cancellation for C5 to cancel the charge electrical potential difference of the capacitor for partial pressures on the capacitor C1 for smooth, and D1 and D2 are the diodes for rectification for obtaining the DC power supply for control.

[0009] Next, actuation of this example is explained. The alternating current supplied from a source power supply 4 is inputted into the input sides a and b of a diode bridge 1. A diode bridge 1 carries out full wave rectification of the inputted alternating current, changes it into a direct current, and outputs this to an output terminal 2-1 and 2-2 through a smoothing capacitor C1 from output sides c and d. Thus, after smooth [ of the main DC power supply outputted from diode BURIIJ 1 ] is carried out by the smoothing capacitor C1, they are supplied to the output terminal 2-1 and load side which is not illustrated from 2-2. In addition, the output side d is [ the output side c of a diode bridge 1 ] on - side by + side.

[0010] After a partial pressure is carried out by capacitors C3 and C4 and the partial pressure electrical potential difference is rectified by diodes D1 and D2, smooth [ of the half-wave rectification electrical potential difference generated between the input side edge child b of a diode bridge 1 and the output side terminal d ] is further carried out by the capacitor C2, and it becomes the DC power supply for control. These DC power supply for control are supplied to the control circuit of the load described above from the power supply terminal 3 for control, for example etc. Here, the capacity of the capacitor C5 connected between the input terminal a of a diode bridge 1 and the output terminal c by the side of + and the above-mentioned capacitors C3 and C4 for partial pressures is set up as there is relation which is described below. By  $1/C5=1/C3+1/C4$ , after all,  $C5=C3C4/(C3+C4)$ , i.e., the capacity of a capacitor C5, is set up so that it may become equal to the capacity when carrying out series connection of the capacitors C3 and C4. And the series circuit of capacitors C3 and C4 is connected between the input terminal b of a diode bridge 1, and the output terminal d by the side of -, since the capacitor C5 is connected between the input terminal a of a diode bridge 1, and the output terminal c by the side of +, the polarity of a part for a part for the direct current voltage charged by capacitors C3 and C4 and the direct current voltage charged by the capacitor C5 is opposite, and it becomes tales doses.

[0011] By the way, although a part for the direct current voltage by which this example was also charged by the capacitors C3 and C4 for partial pressures will be added to the electrical potential difference charged by the capacitor C1 if the current of an output terminal 2-1 and the main DC power supply supplied to a load side from 2-2 becomes small, at this time, the electrical potential difference charged by the capacitor C5 will also be added to the charge electrical potential difference of the capacitor C1 for smooth. However, on this electrical potential difference, since the polarity is opposite, the charge charged by the series circuit of capacitors C3 and C4 as described above, and the charge of each other on the capacitor C1 for smooth charged by the capacitor C5 are canceled after all, and the terminal voltage of a capacitor C1 is maintained by the predetermined main DC-power-supply electrical potential difference.

[0012] According to this example, since the DC power supply for control are pressuring partially and creating the half-wave rectification electrical potential difference outputted from a diode bridge 1 by capacitors C3 and C4, they can lessen the power loss for creating the DC power supply for control. Moreover, although the electrical potential difference charged by the series circuit of said capacitors C3 and C4 is added to the charge electrical potential difference of the capacitor C1 for smooth when the load current of the main DC power supply becomes

small Since said charge electrical potential difference of the capacitor C5 by which the electrical potential difference of reversed polarity was charged with the charge electrical potential difference of said capacitors C3 and C4 is added to the capacitor C1 for smooth at coincidence, Even if said load current becomes small, it is prevented that the terminal voltage of the capacitor C1 for smooth becomes high, and he is trying for there to be no bad influence to the component by the side of a load.

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DESCRIPTION OF DRAWINGS

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## [Brief Description of the Drawings]

[Drawing 1] The circuit diagram having shown one example of the power circuit of this invention.

[Drawing 2] The circuit diagram having shown an example of the conventional power circuit.

[Drawing 3] The circuit diagram having shown other examples of the conventional power circuit.

## [Description of Notations]

1 --- Diode bridge 2-1, 2-2 --- Output terminal

3 --- Power supply terminal for control 4 --- Source power supply

C1, C2, C3, C4, C5 --- Capacitor

D1, D2 --- Diode for rectification

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[Translation done.]

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(71)出願人 000003757

東芝ライテック株式会社

東京都品川区東品川四丁目3番1号

(72)発明者 浦谷 和幸

東京都港区三田一丁目4番28号 東芝ライテック株式会社内

(72)発明者 清水 恵一

東京都港区三田一丁目4番28号 東芝ライテック株式会社内

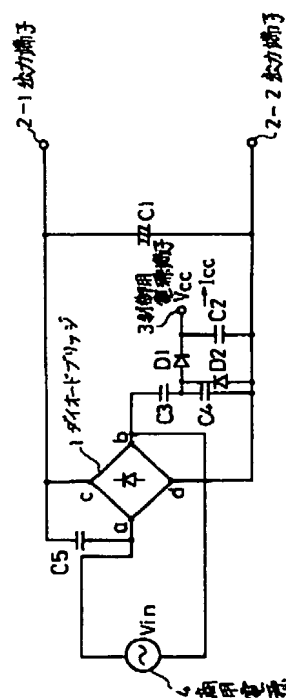
(74)代理人 弁理士 本田 崇

(54)【発明の名称】 電源回路

(57)【要約】

【目的】 本発明は、負荷側に流れる電流が小さくても、主直流電源の出力電圧が所定値よりも高くなることを防止し、且つ制御用直流電源を作るための電力ロスを小さくすることを目的としている。

【構成】 本発明において、ダイオードブリッジ1は商用電源4から入力される交流電流を全波整流して主直流電流に変換する。一方、ダイオードブリッジ1の半波整流電圧はコンデンサC3、C4により分圧された後、ダイオードD1、D2により整流され、更にコンデンサC2により平滑されて制御用直流電源になる。負荷の電流が小さくなると、コンデンサC3、C4にチャージされた電圧が平滑用コンデンサC1に加算されるが、この時コンデンサC5にチャージされた電圧も同コンデンサC1に加算される。しかし、コンデンサC3、C4のチャージ電圧とコンデンサC5のチャージ電圧は逆極性であるため、結局、コンデンサC1の端子電圧は所定電圧を維持する。



## 【特許請求の範囲】

【請求項1】 交流電源をダイオードブリッジで全波整流した後、これを平滑用コンデンサにて平滑して主直流電源を得ると共に、前記ダイオードブリッジから出力される半波整流電圧を直列接続された複数の分圧用コンデンサにより分圧し、この分圧電圧から制御用電源を作る電源回路において、前記ダイオードブリッジから出力される前記分圧用コンデンサにより分圧される半波整流電圧とは逆極性の半波整流電圧でチャージされるコンデンサを具備したことを特徴とする電源回路。

【請求項2】 前記ダイオードブリッジから出力される前記分圧用コンデンサにより分圧される半波整流電圧とは逆極性の半波整流電圧でチャージされるコンデンサの容量を、前記複数の分圧用コンデンサの直列接続容量に等しくしたことを特徴とする請求項1記載の電源回路。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は交流電源を直流電源に変換する電源回路に係り、特に主直流電源とは別に制御用の直流電源を得るための構成に関する。

## 【0002】

【従来の技術】 従来この種の電源回路は例えば図2に示すような構成を有している。商用電源4から入力される交流電流はダイオードブリッジ1により全波整流されてから平滑用コンデンサC1により平滑された後、出力端子2-1、2-2より図示されない負荷側（例えばインバータ等）に出力される。一方、制御用直流電源は抵抗R1と平滑用コンデンサC2との接続点に接続された制御用出力端子3から取り出され、図示されない制御用回路に供給される。即ち、この制御用直流電源はダイオードブリッジ1から出力される主直流電源電圧を抵抗R1により電圧降下させて得ている。ここで、入力電圧を $V_{in}$ とし、制御用端子3から出力される電流を $I_{cc}$ とし、制御用電源端子3の出力電圧を $V_{cc}$ とすると、上記のように抵抗R1の電圧降下によって制御用直流電源を作るため、有効消費電力が

## 【式】

$$\sqrt{2} \times V_{in} \times I_{cc}$$

となって、制御用直流電源を作成するための電力ロスが大きくなるという欠点があった。

【0003】 そこで上記した欠点を回避するために、図3に示すような電源回路が開発されている。この回路では、ダイオードブリッジ1のマイナス側出力端子と交流電流入力端子との間に、コンデンサC3、C4から成る直列回路が接続されている。このコンデンサC3、C4の接続点から得られる分圧電圧はダイオードD1、D2により全波整流された後、平滑用コンデンサC2によって平滑されて、制御用直流電源になる。この回路ではダイオードブリッジ1から出力される半波整流電圧をコンデンサC3、C4で分圧して制御用直流電源を得ている

ため、有効消費電力は約 $V_{cc} \times I_{cc}$ となり、図2に示した回路よりも電力ロス分をかなり小さくすることができる。しかし、出力端子2-1、2-2に接続される負荷側に流れる電流が小さい場合、コンデンサC3、C4にチャージされた直流分の電圧が平滑用コンデンサC1のチャージ電圧に加算されるため、端子2-1、2-2から出力される電圧が高くなってしまいうという欠点があり、場合によっては負荷側の素子に悪影響を与えてしまいうという不都合があった。

## 【0004】

【発明が解決しようとする課題】 上記のように交流電流を直流電流に変換して主直流電源を作ると共に、前記主直流電源よりも電圧が低い制御用の直流電源を作る従来の電源回路では、制御用直流電源を作るための電力ロスを小さくするため、前記交流電流を直流電流に変換するダイオードブリッジから出力される半波整流電圧をコンデンサで分圧することにより、上記制御用直流電源を作っている。しかし、この回路では主直流電源の負荷が軽く、負荷側に流れる電流が小さい場合、前記分圧コンデンサのチャージ電圧が出力される主直流電源電圧に加算されてしまい、前記負荷にかかる出力電圧が高くなって、負荷側の素子等に悪影響を与えるという欠点があった。

【0005】 そこで本発明は上記の欠点を除去し、負荷側に流れる電流が小さくても、主直流電源の出力電圧が所定値よりも高くなることなく、且つ制御用直流電源を作るための電力ロスが小さい電源回路を提供することを目的としている。

## 【0006】

【課題を解決するための手段】 本発明は交流電源をダイオードブリッジで全波整流した後、これを平滑用コンデンサにて平滑して主直流電源を得ると共に、前記ダイオードブリッジから出力される半波整流電圧を直列接続された複数の分圧用コンデンサにより分圧し、この分圧電圧から制御用直流電源を作る電源回路において、前記ダイオードブリッジから出力される前記分圧用コンデンサにより分圧される半波整流電圧とは逆極性の半波整流電圧でチャージされるコンデンサを具備した構成を有する。

## 【0007】

【作用】 本発明の電源回路において、主直流電源の負荷電流が小さくなった時、制御用直流電源を作るための分圧用コンデンサの直列回路にチャージされた電圧が出力側の平滑用コンデンサに加算されるが、ダイオードブリッジから出力される前記分圧用コンデンサにより分圧される半波整流電圧とは逆極性の半波整流電圧でチャージされるコンデンサの前記チャージ電圧が前記出力側の平滑用コンデンサに同時に加算されるため、前記平滑用コンデンサ上で前記両チャージ電圧がキャンセルされ、前記負荷側に出力される主直流電源電圧は常に所定電圧を



【0008】

【0010】ダイオードブリッジ1の入力側端子bと出力側端子dとの間に発生される半波整流電圧はコンデンサC3、C4によって分圧され、その分圧電圧がダイオードD1、D2により整流された後、更にコンデンサC2により平滑されて制御用直流電源になる。この制御用直流電源は制御用電源端子3から例えば上記した負荷の制御回路等に供給される。ここで、ダイオードブリッジ1の入力端子aと+側の出力端子cとの間に接続されているコンデンサC5と、上記した分圧用のコンデンサC3、C4の容量は以下にのべるような関係があるように設定されている。 $1/C5 = 1/C3 + 1/C4$ で、結局 $C5 = C3C4 / (C3 + C4)$ 即ち、コンデンサC5の容量はコンデンサC3とC4を直列接続した時の容量と等しくなるように設定されている。しかも、コンデンサC3、C4の直列回路はダイオードブリッジ1の入力端子bと一側の出力端子dの間に接続され、コンデンサC5はダイオードブリッジ1の入力端子aと+側の出力端子cとの間に接続されているため、コンデンサC

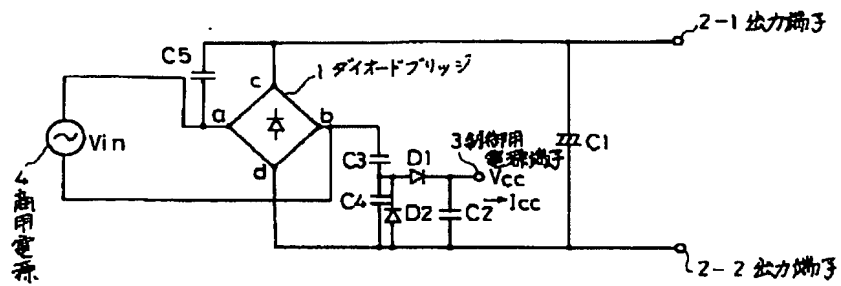
【0013】

【図面の簡単な説明】

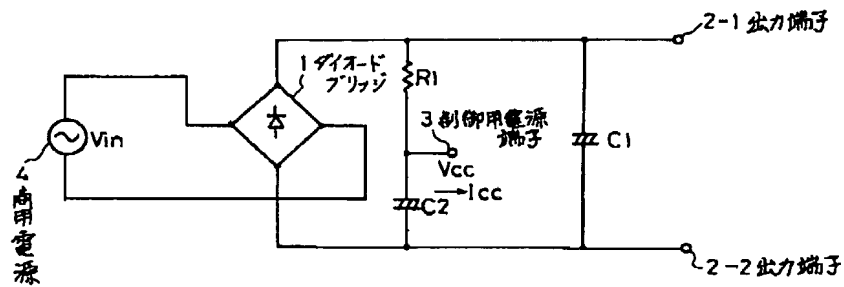
【図3】従来の電源回路の他の例を示した回路図。

D1、D2…整流用ダイオード

【图 1】



【図 2】



【図 3】

